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ILLUSORY JUDGMENTS UNDER CONDITIONS OF UNCERTAINTY:
REASONING ERRORS RELATED TO
PARANORMAL AND RELIGIOUS BELIEFS

BY

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DISSERTATION

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DEDICATION

Dedicated to my mother, Kathy Goforth. Her love for education and teaching is the reason for my success.

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TABLE OF CONTENTS

DEDICATION	iii
ACKNOWLEDGEMENTS	iv
LIST OF TABLES	vii
LIST OF FIGURES	viii
ABSTRACT	ix
INTRODUCTION	1
Definitions of the Paranormal Construct	3
Theoretical Explanations for Belief in the Paranormal	5
Illusory Judgments: Control	8
Illusory Judgments: Prediction and Reasoning Errors	13
Religion's Relation to Paranormal Beliefs	15
Proposed Integration and Rationale for Experiment	20
CHAPTER	PAGE
I. STUDY 1	27
Method	27
Results	29
Discussion	30
II. STUDY 2	32
Method	32
Results	33
Discussion	36
III. STUDY 3	38
Method	40
Results	44
Discussion	53
IV. GENERAL DISCUSSION	58
LIST OF REFERENCES	68

APPENDICES	79
APPENDIX A: EXPERIMENTAL TASK	80
APPENDIX B: IRB APPROVAL LETTERS	93

LIST OF TABLES

1. Table 1: Bivariate Correlation Matrix of Demographics, Correct Probability Judgment, and Scales 47
2. Table 2: Results of Standard Multiple Regression to Predict Total Psychic Selection From Paranormal Beliefs, Personal Involvement, and General Involvement..... 49
3. Table 3: Results of Standard Multiple Regression to Predict Total Psychic Selection From Religious Beliefs and Religious Involvement..... 51

LIST OF FIGURES

1. Study 1: Strategy selection by subjective probability	30
2. Study 2: Strategy selection by subjective probability	34
3. Study 3: Strategy selection by subjective probability	44

ABSTRACT

ILLUSORY JUDGMENTS UNDER CONDITIONS OF UNCERTAINTY: REASONING ERRORS RELATED TO PARANORMAL AND RELIGIOUS BELIEFS

by Erin C. Goforth

University of New Hampshire, May 2008

This research examined the predictors of illusory judgments of prediction under conditions of uncertainty. Study 1 investigated the believability of an experimental manipulation that required participants to choose a strategy for target object selection. Study 2 expanded upon Study 1 by giving participants an additional choice strategy (e.g., a computer's selection). In both Study 1 and Study 2, participants relied on the paranormal strategy (e.g., a psychic) to a greater degree under conditions of uncertainty than under conditions of certainty. Study 3 replicated these results using a between subjects design but also expanded upon Study 1 and 2 by examining individual difference and demographic predictors of paranormal strategy selection under conditions of uncertainty. Paranormal involvement and religious involvement were also analyzed. In Study 3, participants who chose the psychic more often were also more likely to overestimate the probability of correctly locating a hidden object. These results are discussed in terms of illusory prediction. Personal paranormal involvement and religious involvement were associated with less reliance on the psychic strategy, whereas general paranormal involvement was associated with

greater reliance on the psychic strategy. Implications for this research include a possible increased predilection for gambling based upon personal paranormal beliefs. Further, this research indicates that individuals with high paranormal beliefs may be vulnerable toward psychic services during times of uncertainty.

INTRODUCTION

The great philosophers in sociology, Marx, Durkheim, and Weber, theorized that as societies became modernized they would become more complex and rational. As a result of this “modernization”, non-scientific beliefs such as religion and belief in the paranormal would eventually disappear (see Berger, 2008 for a discussion). Contrary to secularization theory, even educated people in the 21st century still hold non-scientific beliefs. In the United States, an estimated 50% of Americans believe in extrasensory perception (as cited in Wiseman & Watt, 2006) and more than 90% of Americans believe in at least one paranormal phenomenon (Gallup, 1997). In the religious realm of beliefs, nearly 44% of Americans would classify themselves as frequent church attendees (Gallup, 2007) and 77% believe in Heaven, 63% believe in Hell, and 58% believe in the Devil (General Social Survey, 2004).

An extensive line of paranormal and religious research has been conducted investigating the differences between believers and non-believers including differences in cognitive ability (Gray & Mill, 1990; Irwin, 1993; Musch & Ehrenberg, 2002), reasoning (Blackmore & Troscianko, 1985; Blagrove, French, & Jones, 2006; Brugger, Landis, & Regard, 1990; Dagnall, Parker, & Munley, 2007; Roberts & Seager, 1999; Wierzbicki, 1985)), and individual differences (Allen & Lester, 1994; Groth-Marnat & Pegden, 1998; Jahoda, 1970; Singer & Benassi, 1981; Tobacyk & Milford, 1983). Under the broad framework of illusory

judgment, many researchers have looked at paranormal and religious beliefs from an illusion of control viewpoint (Brugger et al., 1990; Irwin, 1993; Rudski, 2004); however, the focus of this research is to examine paranormal and religious beliefs from an illusion of prediction viewpoint (see Presson & Benassi, 1996). The relation between illusion of prediction and paranormal/religious beliefs was explored in this research using an online experimental paradigm. The investigation begins with a study that explores participants' reliance on a psychic in a subjective probability card-guessing task. The second study explores whether participants will take advantage of a third choice under conditions of uncertainty in prediction. The focus of the research broadens in the third study, which examines the individual differences that may predict why some participants rely on the selections of a psychic when trying to predict the correct target.

The primary goal of this research was to evaluate the predictors of psychic selection under conditions of uncertainty based upon subjective probabilities of success. It was hypothesized that individuals who held more "self" paranormal/religious beliefs such as believing that they actually had paranormal ability, or those who were behaviorally involved in their beliefs (i.e., performing psychic services or regularly attending church), would rely less on the psychic under conditions of uncertainty. A secondary goal of this research was to determine whether an online sample would support past research findings concerning gender, age (including differences between college students and a more diverse sample of older participants), and the link between religious and paranormal beliefs.

The following literature review begins with the definitions of the paranormal construct in psychology. Theoretical conceptualizations regarding the origins and bases of paranormal beliefs will also be examined such as the cognitive deficit hypothesis (see Irwin, 1993) and the cognitive-experiential self-theory (see Epstein, 1990) including intuitive versus analytical reasoning (Lindeman & Aarnio, 2006). Due to the goals and rationale for this research, a large portion of the theoretical review will examine illusion of control research conducted in the area and the misjudgment of randomness/prediction research. The introduction will end by examining religious beliefs including theoretical explanations for paranormal beliefs as a function of religion.

Definitions of the Paranormal Construct

Defining and conceptualizing paranormal beliefs is a complicated process. Many researchers now agree that paranormal beliefs are representative of a multidimensional construct including such factors as witchcraft, superstition, traditional religious beliefs, and spiritualism (Tobacyk & Milford, 1983), although researchers do not necessarily agree upon how many or which factors constitute paranormal beliefs (Lindeman & Aarnio, 2006).

Another complicating factor in the paranormal field of research is the confusion of superstition, magical thinking, and paranormal beliefs into one or more separate constructs. Tobacyk and Milford (1983) claimed that paranormal beliefs should include superstitions, whereas Brugger and Graves (1997) argued that paranormal beliefs are the same construct as magical thinking. Further, there has not been a general agreement by researchers as to which beliefs are

superstitious and which are paranormal or related to magical thinking. It seems that a reasonable conceptualization of superstitious versus paranormal beliefs might relate to chance events versus behavioral events. Superstition can be attributed to folklore usually dealing with luck such as throwing salt over one's shoulder to ward off bad luck and evil spirits. Paranormal phenomena, on the other hand, includes unlikely behaviors and actions (i.e. telepathy and psychokinesis) that would bring about some result that defies science (Broad, 1949; Goode, 2000).

Definitions of paranormal beliefs have also varied. Literally, the Latin prefix "para" means "outside of" or "beyond" (Goode, 2000). Technically, something that is paranormal is anything that is not normal. In other words, paranormal events are those that cannot be explained by scientific laws or natural forces (Goode, 2000). Paranormal refers both to phenomena (events or abilities) and to beliefs (that the events actually occurred) (Goode, 2000). According to the basic limiting principle definition (the definition used by many parapsychological researchers), paranormal beliefs, if true, would violate the basic limiting principles of science (Broad, 1949; Tobacyk & Milford, 1984). This definition, however, does not differentiate wholly between paranormal, superstitious, or magical beliefs and does not account for other unfounded beliefs that could potentially fit under such a broad conceptualization (Lindeman & Aarnio, 2007). A more narrow definition of the paranormal suggests that such phenomena are scientifically inconceivable processes or domains outside the realm of human capabilities (Irwin, 1993). Lawrence (1995) further suggested that this definition include a

dependence on psi phenomena as the core of paranormal belief. Therefore, the definition used in this dissertation operationalizes paranormal beliefs as beliefs in psi phenomena, which violate scientifically conceivable processes and lie outside the realm of human capabilities (Irwin, 1993; Lawrence, 1995).

The following alleged abilities are commonly referred to as “psi” (mind-to-matter and mind-to-mind influence or communication) (Goode, 2000): telepathy (mind-to-mind communication), clairvoyance (remote viewing without the aid of technology), precognition (seeing the future), and psychokinesis (the ability to move objects with one’s mind) (Goode, 2000). If psychokinesis is excluded, then these abilities are sometimes referred to as ESP (extrasensory perception). ESP is the “apparent ability to receive information via a channel of communication not presently recognized by mainstream science” (Wiseman & Watts, 2006, p. 324).

Belief in paranormal abilities may be manifested in several cognitive forms including self-belief, other-belief, and general-belief. First, individuals may believe that they have such abilities (i.e., “I am able to predict future events before they occur”). Second, they may believe that others have these abilities (i.e., “Some people have the ability to move objects with their minds”). Finally, they may believe that such abilities exist in general (i.e., “I believe in the existence of ESP”).

Theoretical Explanations for Belief in the Paranormal

Researchers have postulated multiple theories to account for paranormal beliefs. First, several researchers have speculated that societal influences result in an emergence of paranormal beliefs (Irwin, 1993). For example, life

experiences may be important predictors of paranormal beliefs especially if family and authority figures hold positive views of paranormal phenomena (Lindeman & Aarnio, 2006; Vyse, 1997). Media experiences may also play a role in the structure of paranormal beliefs (Singer & Benassi, 1981). In fact, individuals high in paranormal beliefs read more material and watch more television with paranormal themes than nonbelievers (Auton, Pope, & Seeger, 2003).

Perhaps more important than societal influences and knowledge gained in childhood from family is the role of psychological attributes in the formation and maintenance of paranormal beliefs. Researchers have examined numerous psychological functions related to paranormal belief endorsement including cognitive-experiential theory and human information processing regarding intuitive versus rational logic (Epstein, 1990; King, Burton, Hicks & Drigotas, 2007), and cognitive deficits including illusory judgments of control (Brugger et al., 1990; Irwin, 1993; Presson & Benassi, 2003; Rudski, 2004) and prediction (Blackmore & Troscianko, 1985; Blagrove et al., 2006; Matthews & Blackmore, 1995; Sutherland, 1992).

Cognitive-experiential self-theory (CEST) is based on a dual-process theory of cognition. CEST maintains that information can be processed from both an experiential (i.e., emotional) and a rational mode (Epstein, 1990). The experiential system is automatic, fast, and linked to the use of heuristics in judgments (Epstein, Pacini, Denes-Raj, & Heier, 1998). On the other hand, the rational system is effortful, logical, and analytical (Epstein, 1990; King et al.,

2007). Individuals high in paranormal beliefs rely more on the intuitive emotional system for processing rather than the analytical rational system (Lindeman & Aarnio, 2006). Furthermore, high believers are those who have perceived experiences of paranormal phenomena and reliance on the experiential/intuitive system to process subsequent paranormal information has caused them to label these events as valid (King et al., 2007). In a study where participants were asked to watch several videos purporting to show ghosts or UFOs, the interaction between intuition (experiential processing) and positive affect significantly predicted whether seeing became believing (i.e., participants with more positive affect were more likely to believe the videos actually showed paranormal or magical phenomena) (King et al., 2007). Results from a study conducted by Lindeman and Aarnio (2006) support the dual process theory of paranormal beliefs; intuitive thinkers more strongly endorsed paranormal beliefs in their study than did analytical thinkers.

Dual-processing theory is related to another line of theoretical research regarding paranormal beliefs. High paranormal believers who rely more on the emotional experiential system are more fixed on monitoring perceived threats in the environment (Lindeman & Aarnio, 2006). Paranormal beliefs might then serve as a cognitive defense against such uncontrollable and potentially threatening events (Irwin, 1993). The endorsement of paranormal belief serves as an illusion of control (Irwin, 1993). Irwin (1993) described the relation between paranormal beliefs and the need for control by stating that paranormal beliefs “tend to make more salient the occurrence of anomalous and uncontrollable events in the

individual's life" (p. 28). A review of the relation between illusory judgment, including illusion of control and illusion of prediction (as well as the cognitive deficit hypothesis), and paranormal beliefs is discussed below.

Illusory Judgments: Control

One type of illusory judgment is the illusion of control. Control refers to the attainment (actual or perceived) of a desired goal (Skinner, 1996). When discussing control, it is important to differentiate between actual control (objective) and perceived control (subjective). Actual control is defined as the extent of control actually present as indicated by a, "normatively appropriate assessment of the action-outcome relationship" (Skinner, 1985, p. 40). In the study of control, however, it is generally the concept of perceived control that has received the most attention. Perceived control is defined as, "the amount of control perceived by the individual either in a specific situation or on the aggregate (generalized) level" (Skinner, 1985, p. 40). It is clear from Skinner's definition that perceived control can be either task-specific or generalized. In addition to actual and perceived control, individuals also may have specific feelings while interacting with the environment in order to produce or avoid some outcome; these feelings are collectively referred to as experiences of control (Skinner, 1996). Experiences of control can determine the subjective level of perceived control (Skinner, 1996).

Past research has shown that an individual's perceived control is associated with both mental and physical well-being (Bandura, 1989; Fiske & Taylor, 1984; Langer & Rodin, 1976; Lefcourt, 1981; Seligman, 1975; Strickland,

1989). Researchers have argued that people are motivated to seek and achieve control (in the form of power, achievement, and self-efficacy) (Baumeister, 1998). In the event that an individual feels threatened by a loss of control, he or she may react in several ways including attempting to regain control or relinquishing control (Skinner, 1996). Researchers have shown that whether or not individuals will engage in efforts to regain control (i.e. cope with the situation) depends upon the attribution or appraisal of the situation (Skinner, 1996). For example, an individual who makes an initial appraisal of high control when threatened with a loss of control may engage in activities such as information seeking to gain a schematic understanding for an event (Fiske & Taylor, 2008) or the individual may exert direct behavioral action to regain control (Fiske & Taylor, 2008; Skinner, 1996). On the other hand, an individual who makes an appraisal of low control will be more likely to experience feelings of helplessness and passivity (Skinner, 1996).

Deprivation of control in an environment that is actually uncontrollable can lead to an illusion of control (Langer, 1975). The illusion of control refers to an individual's expectancy of success even when the probability of success is low (Langer, 1975). Langer (1975) proposed a definition of the illusion of control as, "an expectancy of a personal success probability inappropriately higher than the objective probability would warrant" (p. 313).

Researchers have hypothesized that perceptions of control may be threatened by stress and uncertainty. In an attempt to regain control, people may resort to using magical thinking or superstitious strategies (Jahoda, 1970;

Keinan, 1994; Keinan 2002; Singer & Benassi, 1981). This perceived control could be labeled illusory control (Langer, 1975); actual control cannot be gained using paranormal abilities if these abilities are not based in scientific reality (Musch & Ehrenberg, 2002). For example, Case, Fitness, Cairns, and Stevenson (2004) varied the subjective probabilities of successfully choosing a correct target card. When the probability of success was high, participants chose their own card, which makes sense given their 88% probability of success. When the probability of success was lower (1 out of 8), however, participants chose the card selections of a psychic. The researchers claimed that this decision represented illusory control¹ because participants were trying to reclaim control by relying on a strategy that was perceived as having higher levels of success when their own probability of success was low (Case et al., 2004). Individuals participating in games of chance in past research have exhibited greater levels of paranormal beliefs if they demonstrated an illusion of control (Brugger, et al., 1990; Rudski, 2004).

One way of studying perceived control is by examining participants' locus of control differences. Briefly speaking, locus of control refers to an individual's perception about the underlying causes of events in his or her life. A person with an internal locus of control generally believes that his or her internal characteristics (e.g., one's own effort, ability, or behavior) are responsible for outcomes (Rotter, 1966). At the other end of the continuum, a person with an external locus of control believes that external forces determine outcomes

¹ Case and colleagues (2004) actually believed that their findings were related to participants' illusions of *secondary* control.

(Rotter, 1966). An individual's placement along the continuum is especially important in terms of health, self-efficacy, and well-being. An external locus of control is generally associated with negative coping skills such as attributing outcomes to fate and negatively affecting well-being (Arraras, Wright, Jusue, Tejedor, & Calvo, 2002; Lefcourt, 1982; Pearlin, 1999), whereas an internal locus of control is associated with positive, more effective coping skills such as information seeking and autonomous decision-making (Arraras, et al., 2002; Crisson & Keefe, 1988; Lefcourt, 1991). An internal locus of control is also generally associated with greater health and healthier behavior (Ai et al, 2005; Ali & Lindstrom, 2006; Ecklund & Backstrom, 2006; Langer, 1983; Rodin & Langer, 1977; Schulz, Thompkins, Wood, & Decker, 1987).

Contrary to the findings supporting the relation of illusion of control to paranormal beliefs, an extensive amount of research has found that an *external* locus of control is associated with greater paranormal beliefs (Allen & Lester, 1994; Groth-Marnat & Pegden, 1998; Jahoda, 1970; Scheidt, 1973; Snel & Sijde, 1997; Tobacyk & Milford, 1983; Tobacyk, Nagot, & Miller, 1988). Some researchers, however, have found no relation between an external locus of control and paranormal beliefs (Haraldsson, 1981) or they have found that the relation is dependent upon whether researchers are examining traditional religious beliefs (Dag, 1999) or precognition and psi (Peltzer, 2002). One study conducted with an older age group of participants (55-73) indicated no positive correlation between paranormal beliefs and external control (Banziger, 1983).

Conflicting findings in the literature regarding perceived control (including locus of control) and paranormal beliefs may be explained when one examines the experimental paradigms used to study control. In their meta-analytic review, Presson and Benassi (1996) argued that many researchers who have discussed their studies in terms of control measurement are sometimes actually measuring other types of illusory judgments such as illusion of prediction. The researchers argued that Langer's (1975) classic study in which participants were given the choice of keeping a lottery ticket or exchanging it for another was actually not a direct study of control, but rather "she inferred personal control perceptions on the part of her research participants" (Presson & Benassi, 1996, p. 497).

Using Presson and Benassi's (1996) argument, one might conclude that Case and his colleagues (2004) were actually studying participants' illusory predictions, their perceived ability to predict target cards or their belief that another individual (the psychic) was able to predict target card choices. In fact, the task they used is really a measure of belief in clairvoyance – an ability to gain information through psychic means. In other words, clairvoyance is the ability to see or predict current events, such as cards in a guessing task. Additionally, in the study conducted by Brugger and colleagues (1990) participants did not *actually* have control in the study. Instead, they were asked to *predict* the probability of hypothetical dice rolls. The focus of this research, therefore, is on illusory judgments under the framework of illusion of prediction. Paranormal beliefs might arise from errors in human judgment (Singer & Benassi, 1981) and the illusion of prediction may be one of these errors in judgment.

Some researchers have argued that errors in human judgment related to paranormal beliefs result from deficiencies in cognitive processes or skills (Irwin, 1993). The cognitive deficit hypothesis refers to the premise that cognitive deficiencies are positively associated with paranormal belief (Irwin, 1993). Below, I will review the research conducted in the area of cognitive deficiencies including errors in prediction and errors in reasoning.

Illusory Judgments: Prediction and Reasoning Errors

High believers in the paranormal tend to make more reasoning errors than nonbelievers (Blackmore & Troscianko, 1985; Blagrove et al., 2006; Brugger et al., 1990; Dagnall et al., 2007; Roberts & Seager, 1999; Wierzbicki, 1985) and are less able to think critically (Gray & Mill, 1990). According to the probability misjudgment theory, paranormal beliefs may actually make participants more likely to misjudge probabilities, which may lead believers to illusory predictions - believing they can predict random events (Blackmore & Troscianko, 1985; Blagrove et al., 2006; Matthews & Blackmore, 1995; Sutherland, 1992). In another experiment, high believers in the paranormal were also more likely to rate the probability of throwing one die 10 times and rolling all sixes as more probable than throwing 10 dice one time and rolling all sixes (Brugger et al., 1990). The results suggest that believers are less likely than nonbelievers to either incorrectly judge probability rates or to accept that repetitive events happen by chance (Brugger et al., 1990; Williams & Irwin, 1991). This latter suggestion is supported by research findings that participants who give self-reports of belief in ESP are more likely to underestimate chance baseline than

are nonbelievers in a random game of chance (Blackmore & Troscianko, 1985). Additionally, high believers were more likely to judge they were exerting control in a psychokinesis experiment based upon chance scoring than did nonbelievers (Benassi, Sweeney, & Drevno, 1979).

The probability misjudgment theory has been contested. When cognitive abilities are controlled for in games of chance, often the relation between paranormal beliefs and errors in probabilistic judgments disappears. These results suggest that differences in cognitive ability can account for paranormal beliefs (Musch & Ehrenberg, 2002). On the basis of their findings, Musch and Ehrenberg (2002) concluded that errors in probability judgments were not associated with paranormal beliefs. In a newspaper survey assessing participants' judgments of probability, Blackmore (1997) found that probability misjudgments were not predictive of paranormal beliefs. Other research has supported the finding that probability misjudgments are negated once education and cognitive ability have been controlled (Bressan, 2002). Similarly, other research has supported the finding that probability misjudgments are not significant predictors of paranormal beliefs (Roberts & Seager, 1999). However, this research did support the theory that paranormal believers are more likely to show reasoning errors such as lessened ability for conditional reasoning (Roberts & Seager, 1999).

Dagnall and colleagues (2007) argued that the probability misjudgment hypothesis has only been studied in a partial way given the type of problems used to assess such misjudgments. In their research, they used a variety of

probabilistic reasoning tasks including the conjunction fallacy, perception of randomness, derivation of expected values, and use of base rate information (Dagnall et al., 2007). Based upon their results, they concluded that errors in probabilistic reasoning are conducive to paranormal beliefs, but only those errors related to misperception of randomness. Their results support the theory that high paranormal believers are more likely to discount the role of chance than nonbelievers (Brugger et al., 1990; Williams & Irwin, 1991). High paranormal believers, therefore, are more likely to believe that they can predict chance outcomes. In sum, research suggests that paranormal believers have faulty cognitions, which include illusory judgments (i.e., underestimating chance coincidences resulting in illusions of prediction).

Another theory in the parapsychological research is that cultural influences may cause the endorsement of paranormal beliefs. Religion is one such powerful cultural influence, which may be related to belief in the paranormal. In fact, it is not uncommon for religions, such as Buddhism, to celebrate psi abilities such as clairvoyance. The rest of this review will discuss the role of religion in the endorsement of paranormal beliefs.

Religion's Relation to Paranormal Beliefs

Religion is a powerful predictor of a wide range of behavior and social attitudes (Dillon, 2003). National surveys document that the majority of Americans have a religious affiliation and believe in God (Newport, 2007). Furthermore, spirituality is growing and is less constrained by traditional religion than in the past (Roof, 2003). Religion refers to scriptures, social institutions,

rituals, beliefs, practices, and so on, whereas spirituality refers more to an inner sense of transcendence and self-transformation (Roof, 2003). Researchers must consider spiritualism when studying aspects of religiosity.

There are similar parallels between religion and paranormalism including, first, an emphasis on rejection of the material and acceptance of the spiritual and, second, a belief in non-hypothetical truths (Goode, 2000). Certain characteristics of Eastern religions are, in themselves, paranormal including faith-healing, miracles, reincarnation, and visions (Goode, 2000). In fact, individuals who believe in paranormal phenomena are also more likely to accept a spiritual orientation to life (Goode, 2000). Findings from the Southern Focus Poll conducted by the University of North Carolina (as reported by Rice, 2003) indicated that 58.6% of respondents believed in psychic or spiritual healing, and 27.1% believed that they could use their own minds to heal their bodies. These findings obviously contradict the popular belief that Christians will not hold classic paranormal beliefs because church dogmas do not support such beliefs (Sparks, 2001).

Religious individuals and believers in the paranormal must believe in that which cannot be scientifically proven and must rely on faith in certain beliefs. Even in the face of irrefutable evidence, there is often a strong tendency to believe. For example, Singer and Benassi (1986) found that, even after informing participants that the "magic" they had witnessed was replicable and pretend, participants still strongly maintained their beliefs that an actor's performance was indicative of his psychic abilities. Interestingly, many students pointed to their

religious beliefs as the explanation for their acceptance of the actor's psychic ability (e.g., "...I am a Christian and I feel strongly that ESP or anything dealing with that is of Satan") (Singer & Benassi, 1986, p. 62).

The results of research that has examined the association between religious beliefs and paranormal beliefs has been mixed. Some researchers have found that religious people more strongly endorse paranormal beliefs (Goode, 2000; Hergovich, Schott, & Arendasy, 2005; Thalbourne, Dunbar, & Delin, 1995; Tobacyk & Milford, 1983), whereas some researchers have found that "non-religious" people tend to endorse paranormal phenomena more strongly than religious people (Aarnio & Lindeman, 2007; Bainbridge & Stark, 1980; Beck & Miller, 2001). Other researchers have claimed that paranormal beliefs are a substitute for traditional religious beliefs (Emmons & Sobal, 1981; Harrold & Eve, 1986; Wuthnow, 1978). Results obtained by Hergovich et al., (2005) partially support the substitution hypothesis; however, they claim that paranormal belief can be, but is not necessarily, a substitute for traditional religion. The researchers found that the relation between belief in the paranormal and religiosity was significantly higher for participants without religious affiliation (although this does not mean they were not spiritually inclined) than for Catholics and Protestants (Hergovich et al., 2005).

Researchers have often associated New Age beliefs and belief in witchcraft as "non-religious" beliefs (Bainbridge & Stark, 1980; Goode, 2000). A subscale of Tobacyk's (1988) Revised Paranormal Belief Scale is that of witchcraft (i.e., "witches do exist"), which is a separate subscale from traditional

religious beliefs (i.e., “there is a heaven and a hell”). This separation of religious beliefs from witchcraft beliefs could be an unfortunate error on the part of researchers studying religion’s role in paranormal belief development. Wicca, a Neo-Pagan religion, has an estimated two million followers (Taniquetil & Arghuicha, 1999-2001). It is inaccurate for researchers to claim that witchcraft is a separate belief system from religious beliefs; it depends on whether witchcraft constitutes a religious worldview for the participant. An individual’s endorsement of phenomena that are typically considered paranormal (i.e., precognition, telekinesis, clairvoyance) might predispose that individual toward choosing a religion that is formatted with an emphasis on such paranormal abilities (or visa versa and religion contributes to greater paranormal beliefs) (Willin, 2007). Religion is a relevant variable in the examination of paranormal beliefs.

Religiosity has also been related to illusory judgments, in particular to illusion of control. In a crisis, individuals may feel threatened by a loss of control. Faith is one way of coping with this loss (Hood, Spilka, Hunsberger, & Gorsuch, 1996). Pargament and colleagues (1988) developed a theory of religious coping and problem-solving. In their theory, they distinguished between three types of religious problem-solving/coping: 1) the collaborative style in which the individual and God are in active partnership; 2) the self-directive style in which reliance is on the self rather than on God in dealing with problems; and 3) the deferring style in which the individual relinquishes all problems for God to resolve. These styles of problem solving have been related to locus of control. The deferring style of religious belief is associated with external control, whereas the collaborative style

and self-directed style of religious belief are more associated with internal control (Pargament et al., 1988). Some research, however, has contradicted the finding that religiosity is related to personal perceived control; an inverse relation between religiosity and perceived control was found in a sample of older Americans (Shaw & Krause, 2001).

An explanation for the contradictory results between religiosity and perceived control can be attributed to the complex nature between faith and control. There are multiple pathways by which faith may be related to perceived control (Ai et al., 2005). First, religiosity may contribute to perceived control in uncontrollable situations (Ai et al., 2005). Second, some individuals may surrender to God, a religious worldview that discourages personal control (Ai et al., 2005).

Understanding religion's role in the formation of beliefs about perceived control is important from a health perspective. Marx referred to religion as "the opiate of the masses" ([1852] 1983); however, religion can actually contribute to a sense of personal efficacy and control over life outcomes. The passive deferring style of belief has been associated with depression and anxiety (Exline, Yali, & Lobel, 1999), whereas the collaborative and self-directive styles of belief have been associated with better well-being, health, and increased self-worth (Ellison, 1993; Krause, 1995). Religious attendance also fosters mental health by enhancing self-esteem and personal efficacy (Ellison, 1993; Krause, 1995). Through self-directed and collaborative styles of belief, individuals increase their control and their mental health (Pargament et al., 1988). In a meta-analytic

review, McCullough and Smith (2003) reported that individuals with high levels of religiousness reported lower levels of depression. Religious attendance has also been associated with lower “hazard of death” (McCullough & Smith, 2003, p. 194) from various causes including suicide (Hummer, Rogers, Nam, & Ellison, 1999; Martin, 1984; Strawbridge, Cohen, Shema, & Kaplan, 1997). These results can also be partially attributed to the integrative capacities of religion in providing individuals with social networks that give a sense of belonging to and satisfaction with the community (Martinson, Wilkening, & Buttel, 1982).

Religious affiliation and religiosity have not been studied in terms of illusory judgments other than control. This gap in the literature leads to questions about religiosity’s relation to illusory prediction. If religiosity is related to belief in the paranormal, will high believers exhibit similar illusions in judgments? Further, if religiously inclined individuals are more likely to more strongly endorse paranormal beliefs, will they (in relation to paranormal believers) also be more likely to rely on a paranormal strategy in a card-guessing task?

Proposed Integration and Rationale for Experiment

The evidence available from previous research supports the idea that high believers in the paranormal exhibit more illusory judgments than skeptics. These reasoning errors such as misperception of randomness (Dagnall et al., 2007) lead high paranormal believers to discount the role of chance more than nonbelievers (Brugger et al., 1990; Williams & Irwin, 1991). In other words, believers in the paranormal are more likely than skeptics to find meaning in coincidences (Zusne & Jones, 1982). Possible life events (e.g., using a psychic

in the past) might lead high believers to faulty cognitions such that they believe the psychic is able to predict future events due to psi abilities. The current research will examine errors in reasoning, in particular illusory judgments of prediction, in a card-guessing task.

Religion has been studied in relation to paranormal beliefs (Haraldsson, 1981; MacDonald, 1995; Thalbourne & Houtkooper, 2002; Tobacyk & Tobacyk, 1992) and many researchers have linked religious beliefs to beliefs in the paranormal (Goode, 2000; Hergovich et al., 2005; Thalbourne, Dunbar, & Delin, 1995; Tobacyk & Milford, 1983). Aarnio and Lindeman (2007) found that religious believers were more likely than skeptics to rely on error prone intuitive thinking; however, cognitive reasoning in the form of illusory prediction has not been studied in relation to religious beliefs. The current research will examine the role of religious beliefs in illusory judgments of prediction and also determine if religiosity is associated with external control.

The majority of researchers who have examined paranormal beliefs have tended to rely upon data from undergraduate college samples. A potential problem with using undergraduate students as the primary participants in these past studies is that the involvement of the students may be lower than a sample of adults who may be more actively involved in paranormal activities (McGarry & Newberry, 1981). Messer and Griggs (1989) conducted a study in which they asked students in an introductory psychology class about their belief in paranormal phenomena and their actual personal involvement. In partial support of the view that students are less involved, but have high paranormal beliefs,

they found that, although 56.8% of students stated some to strong belief in ESP/psychokinesis, only 18.3% were personally involved in paranormal activities.

McGarry and Newberry (1981) examined involvement in paranormal beliefs in a sample consisting of psychic readers (the most involved), ESP newsletter subscribers, psychic fair attendees, and students (least involved). The researchers found that belief in paranormal phenomena was associated with locus of control, but whether control was external or internal was mediated² in part by involvement in paranormal beliefs. A psychic reader, therefore, would have a more internal locus of control than a college student, for example, who may hold paranormal beliefs, but who has no involvement in such beliefs. "Paranormal beliefs are associated with internality under conditions of behavioral involvement, but externality when such involvement is lacking" (McGarry & Newberry, 1981, p.734).

The conclusion that paranormal involvement plays an important role in perceived control is supported by the research of Benassi and colleagues (1979). They found that active/internal participants were more confident in their level of control on more psychokinesis experimental trials than were active/external, passive/internal, or passive/external participants. The conclusion from their research is that active involvement in a task leads to higher levels of perceived control *if* a person has an internal locus of control (Benassi et al., 1979).

² McGarry and Newberry refer to paranormal beliefs as being mediated by involvement. In accordance with Baron and Kenny's (1986) distinctions between mediating and moderating variables, the term moderating is probably more appropriate.

Paranormal beliefs may encourage involvement and involvement may reinforce beliefs (Irwin, 1993).

Involvement in religion may also be an important variable. Frequency of church attendance in the United States is a contested issue. General Social Survey (2004) data indicate that approximately 28.3% of Americans attend church weekly or more often and 21.9% attend church at least monthly. However, some researchers have claimed that, when one actually takes into account church attendance records, self-reported attendance rates inflate actual attendance by approximately 50% (Chaves & Stephens, 2003). Keeping this in mind, it does appear that frequency of church attendance and involvement in religious activities is related to illusory control (Shrauger & Silverman, 1971).

Research conducted by Shrauger and Silverman (1971) indicated that Protestants had a significantly more internal locus of control than Jewish participants, whereas Catholics did not differ significantly from either group. The Protestant participants reported greater religious participation and church attendance than the Jewish participants. However, the Jewish and Protestant participants did not differ significantly when only frequent attendees were analyzed. Shrauger and Silverman (1971) theorized that involvement in religious activities allowed participants to perceive that they controlled what happened to them in their lives.

In terms of religious involvement with paranormal beliefs, Yamane and Polzer (1994) found that participants who were religiously involved (i.e., church attendance and prayer) were *more* likely to report paranormal experiences

related to religion (such as ecstatic experiences). The researchers argued that religiously involved (or absorbed) individuals would be more likely to report ecstatic experiences. Additionally, religiously involved participants have been found to be more likely to endorse paranormal beliefs related to telepathy (MacDonald, 1995).

These research findings raise the concern that involvement *needs* to be considered when researching religious and paranormal beliefs in relation to illusory judgments. Participants in the current research will be asked to indicate their involvement in both religion and the paranormal. For example, participants will be given a checklist of psychic services and asked if they have used or performed these services. Further, participants will be asked about their level of involvement in their religion (e.g., church attendance). To expand upon past research, involvement will be used as a predictor of strategy choice in a card-guessing task. This will be the only research, to date, to examine involvement (both religious and paranormal) using an illusion of prediction framework.

One might question why it is important to study paranormal or religious beliefs. Putting aside the pervasiveness of these beliefs, one might consider the psychological advantages and disadvantages of endorsing non-scientific beliefs. Many studies have found that beliefs in the paranormal are associated with poor psychological adjustment, including irrational beliefs (Roig, Bridges, Renner, & Jackson, 1998), high trait anxiety (Wolfradt, 1997), psychopathology and dissociation (Dag, 1999; Gow, Lang & Chant, 2004), and low self-efficacy (Tobacyk & Shrader, 1991). On the other hand, researchers in the field of

religious beliefs have found that higher levels of religiosity are positively associated with greater levels of happiness (Abdel-Khalek, 2006), self-esteem (Keyes & Reitzes, 2007), optimism (Abdel-Khalek & Lester, 2007), physical health and mental health (Abdel-Khalek & Lester, 2007). Religiosity has been found to be negatively associated with alcohol use (Rostosky, Danner, & Riggle, 2007), depression (Keyes & Reitzes, 2007), pessimism and suicidal ideation (Abdel-Khalek & Lester, 2007).

There are many questions that remain unanswered or require further study in the paranormal and religious literature. First, are religiosity and belief in the paranormal related, and if so, will believers in the paranormal differ from believers in religion in a card-guessing task? Second, will religious and/or paranormal involvement differentiate participants who choose a psychic strategy from those who choose their own target selection? Will these results be related to an illusion of prediction and will they support the theories that paranormal beliefs are related to errors in reasoning such as misperception of randomness or probability? Finally, will paranormal and religious beliefs be associated with external control and can participants be differentiated based upon their level of religious/paranormal involvement?

In Study 1, the experimental paradigm was assessed for believability and validity. Participants were asked to choose a card themselves or rely on the preexisting selections of a psychic. In Study 2, the addition of a third choice was assessed. Would participants still use the psychic's selections if another choice were available to them? Study 3 expanded on the findings of past research by

integrating religious and paranormal beliefs into an examination of illusory judgments under conditions of uncertainty. The goals of Study 3 included examining the individual differences that affected strategy selection as well replicating the findings from the first two studies.

CHAPTER I

STUDY 1

Study 1 was conducted to test the believability of the experimental paradigm. It was hypothesized that when the subjective probability of success in a card-guessing task was low, participants would rely on the selections of another person. By relying on the prediction abilities of an outsider (e.g., a psychic), the participant would be making an illusory judgment that another individual was better able to predict chance events.

Method

Participants

Data were collected from 169 participants (61% female). Of these participants, 49.5% were aged 18-24, 36.9% were aged 25-39, and 13.6% were older than 40. Further, 77.7% were Caucasian and 63% had completed at least some college work (only 15.5% had stopped their education after high school).

Materials

Participants completed an online experiment on the SurveyMonkey site. Study 1 was conducted using a within subjects method. Participants were given 10 trials (5 high probability and 5 low probability) and were asked to pick the correct card(s) out of 8 cards. They were informed that the probability of success was either 7:8 (high probability) or 1:8 (low probability). Participants completed

one of two ordered conditions. Condition 1 was ordered so that a high probability trial came first; condition 2 was ordered so that a low probability trial came first. The participants were told they could either pick a card themselves or have somebody else choose a card for them. The “somebody else” was described as individual who reported having psychic abilities such as ESP and precognition.

Procedure

Participants were recruited using several different methods. First, every fifth group listed in each category of Yahoo Groups was selected, although selection was also dependent upon group rules (no spam postings) and the function of the group (only very specific topics allowed as postings). The moderators of these groups were emailed and asked if they could forward the link of the survey to their listserv. Second, the link was posted on the websites socialpsychology.org and psych.hanover.edu. Each participant was given a unique ID, which was not linked to any personal information, ensuring complete anonymity of participants. Furthermore, the researcher opted not to collect IP addresses, which could be used to track participants.

Participants were told they were participating in an experiment researching the cognitive processes involved in online gambling. All participants were told they would be entered into a drawing to win a \$25 online gift certificate. After completing the experiment, when participants hit the “done” button, they were brought to a page that was separate from the experimental survey. This page included the debriefing form and a drawing entry form. Participants who wanted to enter the drawing were asked to fill in their personal information

including name and email address. Again, data and personal information remained entirely separate.

Results

First, to determine whether there were order effects of high versus low probability as the first card selection, a MANOVA was conducted with the total psychic selection on the high probability and the low probability trials as the dependent variables and order as the independent variable. Order did not effect total psychic selection on the low probability trials ($F(1,153) = 1.11, p = .30$) or on the high probability trials ($F(1,153) = .000, p = .990$).

To evaluate whether the probability of successfully choosing the correct card influenced the choice to self-select a card or to rely on the preexisting selections of the psychic, a paired-samples *t*-test was conducted. Participants were tested under two conditions (five trials each): (1) high probability of success and (2) low probability of success. The low probability trials and the high probability trials were coded so that 1 = choosing the psychic and 0 = making one's own choice. The mean for the low probability of success trials ($M = 1.99$, psychic chosen on 39.58% of trials) was significantly different from the mean for the high probability of success trials ($M = .34$, psychic chosen on 6.72% of trials): $t(154) = 9.53, p < .001$. When the probability of success was low, participants relied more on the preexisting selections of the psychic compared to when the probability of success was high (Figure 1).

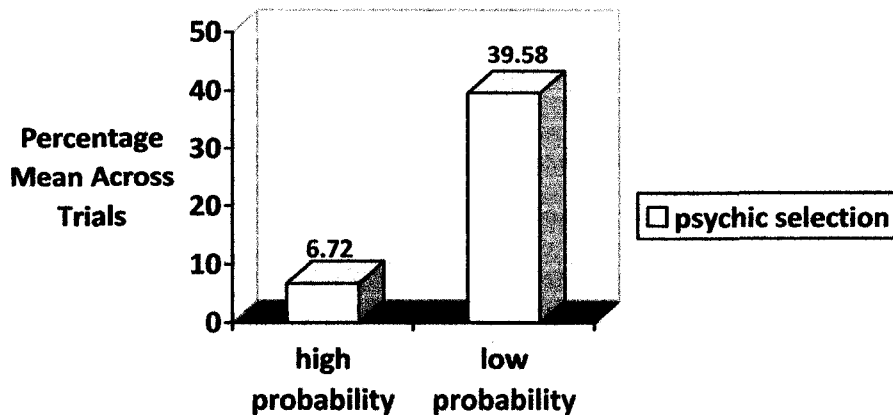


Figure 1: Strategy selection by subjective probability

To determine whether any of the demographic variables (age, gender, education) as well as having used psychic services in the past predicted choice of psychic or self, standard multiple regressions were conducted using the total psychic selection for the high probability trials and the total psychic selection for the low probability trials as dependent variables. The regression models did not have significance, indicating that the only variable associated with strategy choice was probability of success.

Discussion

These results supported previous research (see Case et al., 2004) that participants will rely significantly more on the preexisting selections of the psychic when their subjective probability of success was low. Under conditions of

uncertainty, participants believed that the psychic was better able to predict target card choices. However, these results do not indicate an illusion of control (Case et al., 2004), but rather they indicate that participants believed that the psychic was better able to predict hidden card choices when the probability of success was low. These results are more aptly discussed using an illusion of prediction framework (Presson & Benassi, 1996).

The results from this study support past research that participants who endorse paranormal beliefs make more reasoning errors than nonbelievers (Blackmore & Troscianki, 1985; Blagrove et al., 2006; Brugger et al., 1990; Dagnall et al., 2007; Roberts & Seager, 1999; Wierzbicki, 1985). The results were not related to any demographic variables such as age, education, gender, or whether the participants had used a psychic before. The only variable that predicted reliance on the psychic was the probability of successfully choosing the target card.

Further exploration of the relation between subjective probabilities and the illusion of prediction could be made by studying whether participants would rely on a more rational choice rather than on the psychic when such an option is made available. If, even given a third strategy choice, participants still rely on the psychic more substance can be given to the illusion of prediction results of this study. For this reason, Study 2 explores the choices made by participants in a card-guessing task when they can choose the choices of a psychic or have the computer make the selection for them.

CHAPTER II

STUDY 2

Study 2 was conducted to evaluate if the availability of a third choice (e.g., a computer's selection) would be used by participants rather than relying on the psychic under conditions of uncertainty. In this study, participants were given the choice of having the psychic choose a card for them or allowing the computer to make a random selection. If belief in the paranormal was not related to strategy selection, participants should be equally likely to choose the computer as the psychic.

Method

Participants

The sample consisted of 71 participants (62% female). Of the participants, 39.4% were aged 18-24, 39.4% were aged 25-39, and 21.2% were older than 40. Further, 78.9% were Caucasian and 77.5% had completed college.

Materials

As in Study 1, Study 2 used a within subjects design. Participants were given 10 trials (5 high probability trials and 5 low probability trials) asking them to pick the correct card(s) out of 8 cards. The probability of success was either 7:8 (high) or 1:8 (low). As in the first study, on each trial the participants were told they could either pick a card themselves or have somebody else choose a card

for them. The “somebody else” was an individual reported as having psychic abilities. Study 2 differed from Study 1, however, in that participants were also given a third choice (having the computer make a random card selection for them).

Procedure

The procedure used in Study 1 was also used in Study 2. Participants were told they were participating in an experiment researching the cognitive processes involved in online gambling. All participants were told they would be entered into a drawing to win a \$25 online gift certificate. After completing the experiment, when participants hit the “done” button, they were brought to a page that was separate from the experimental survey. This page included the debriefing form and a drawing entry form. Participants who wanted to enter the drawing were asked to fill in their personal information including name and email address. Again, data and personal information remained entirely separate.

Results

To determine whether the probability of successfully choosing the correct card influenced the choice to self-select a card, to rely on the preexisting selections of the psychic, or to allow the computer to make a random selection, several paired-samples *t*-tests were conducted. Participants were tested under two conditions (five trials each): (1) high probability of success and (2) low probability of success. The low probability trials and the high probability trials were coded to determine whether the mean number of times the participants chose the psychic was significantly different from the mean number of times the

participant chose the computer or the mean for self-selection based upon subjective probability levels.

For the first planned contrast, the psychic was coded as 1 and the choices of computer and self were coded as 0. When the subjective probability was high, 93% of participants always chose their own card; however, when the probability of success was low, only 52.1% always chose their own card. The mean for the low probability of success trials ($M = 1.07$, psychic chosen on 21.62% of trials) was significantly different from the mean for the high probability of success trials ($M = .08$, psychic chosen on 1.62% of trials): $t(70) = -5.44$, $p < .001$. Thus when the probability of success was low, participants relied more on the preexisting selections of the psychic compared to when the probability of success was high (Figure 2).

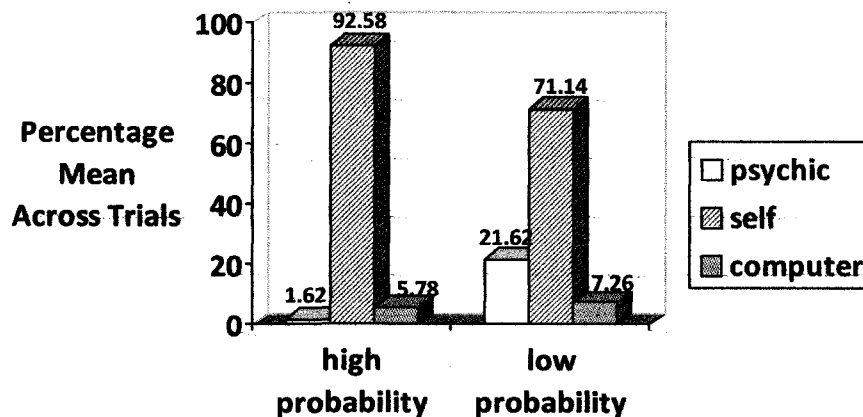


Figure 2: Strategy selection by subjective probability

The second planned contrast was conducted to assess if the mean number of times the participant chose the psychic differed significantly from the mean number of times the participants chose his or her own card. Psychic was coded as 1, self was coded as -1, and the computer was coded as 0. When the probability of success was high, 83.1% of participants always chose their own card; however, when the probability of success was low, only 48% of participants always chose their own card. The mean for the low probability of success trials ($M = -2.51$)³ was significantly different from the mean for the high probability of success trials ($M = -4.55$): $t(70) = -5.78, p < .001$. Although participants were more likely to choose their own card across the probabilities, they were more likely to rely on the psychic selections when the subjective probability of success was low compared to when it was high.

The third planned contrast was conducted to assess if the choice of psychic differed significantly from the choice to allow the computer to make a random selection. Psychic was coded as 1, computer was coded as -1, and self was coded as 0. The mean for the low probability of success trials ($M = .72$) was significantly different from the mean for the high probability of success trials ($M = -.20$): $t(70) = 3.66, p < .001$. Participants were more likely to rely on the psychic selections than to allow the computer to make a random selection when the subjective probability of success was low compared to when it was high.

To assess whether any of the demographic variables (age, gender, education) as well as having used psychic services in the past predicted choice

³ Note that means are negative because self was coded as -1. Negative numbers indicate that participants chose their own card to a greater extent than relying on the psychic's selections.

strategy, standard multiple regressions were conducted using the total psychic selection for the high probability trials and the total psychic selection for the low probability trials as dependent variables. The regression models did not have significance, although in the low probability condition, age uniquely predicted a significant proportion of variance in number of times the psychic was selected ($p = .047$) and in the high probability condition, gender uniquely predicted a significant proportion of variance in number of times the psychic was selected ($p = .050$). Younger participants and women chose the psychic more often than older participants and men.

Discussion

Even when given a third choice selection, participants were still inclined to rely on the prediction abilities of the psychic rather than allow the computer to make a random selection. Further, 71% of participants chose their own cards in the apparent belief that they were able to predict target cards.

Why do some participants rely on the selections of the psychic (i.e., other's prediction ability) rather than choosing a card themselves (i.e., self prediction ability)? Do the paranormal beliefs of participants affect their strategy selection? If the belief in the paranormal is related to errors in reasoning, will high believers be more likely to misjudge probabilities or to misjudge randomness and believe they (or others) can predict random events (Blackmore & Troscianko, 1985; Matthews & Blackmore, 1995; Sutherland, 1992)? Further, if paranormal beliefs are linked to religious beliefs (Goode, 2000; Hergovich et al., 2005; Thalbourne, Dunbar & Delin, 1995; Tobacyk & Milford, 1983), will highly religious

believers differ from participants with low levels of religiosity? Will religiosity be related to errors in reasoning such as the illusion of prediction? Additionally, will participants who are highly involved in their beliefs (i.e., believe they can predict chance events or perform paranormal services) affect their strategy? The purpose of Study 3 was to evaluate whether individual differences of participants (i.e., religiosity or paranormal beliefs) would predict strategy choice in a card-guessing task.

Unlike the first two studies, Study 3 was conducted using a between subjects design. In the first two studies, participants received five trials of each probability in which the high trial came first and the low trial came second or vice versa. This order enabled participants to compare probabilities from trial to trial and may have resulted in some participant suspicion about the purpose of the study. In Study 3, participants were not able to compare probabilities from trial to trial. This will provide a replication using a different design if participants still choose the psychic to a greater degree in the low probability condition.

CHAPTER III

STUDY 3

The basic purpose of Study 3 was to evaluate whether the results from the first two studies would replicate using a between-subjects design. The second purpose was to investigate how individual differences (such as paranormal and religious beliefs and involvement) as well as errors in reasoning predicted illusory judgments of prediction. It was hypothesized that high believers in the paranormal would rely on the psychic's selections to a greater degree under conditions of uncertainty (i.e., low subjective probability) and to a greater degree than low believers. On the other hand, it was hypothesized that individuals with high personal paranormal involvement (i.e., performance of psychic services as well as the belief in own psychic abilities) would choose the psychic less often than individuals with low personal involvement. Further, it was hypothesized that participants with only general paranormal involvement (i.e., having used a psychic in the past, but not being personally involved) would choose the psychic more often based upon past experience than participants with low general involvement.

In terms of religious beliefs, it was hypothesized that religiosity would be positively related to belief in the paranormal (see MacDonald, 1995; Yamane & Polzer, 1994). Further, it was expected that participants who were higher in

religious involvement (e.g., church attendance and religiosity) would rely less on the selections of a psychic.

It was expected that women would endorse paranormal (Vyse, 1997) and religious beliefs (Stark, 2002) to a greater extent than men. It was expected, that younger participants (college students) would choose the psychic selection more often than older participants based upon past research indicating that college students are less involved in their paranormal beliefs and religious beliefs when compared to an older sample (McGarry & Newberry, 1981).

It was also hypothesized that the probability misjudgment hypothesis would not be related to paranormal beliefs (Blackmore, 1997; Bressan, 2002; Musch & Ehrenberg, 2002; Roberts & Seager, 1999); however, it was expected that overestimation of probability would be associated with choosing the psychic more often (i.e., an illusion of prediction). Finally, based upon past research, it was expected that participants with low paranormal or religious involvement would exhibit an external locus of control (see Allen & Lester, 1994; Groth-Marnat & Pegden, 1998; Jahoda, 1970; Scheidt, 1973; Snel & Sijde, 1997; Tobacyk & Milford, 1983; Tobacyk, Nagot, & Miller, 1988); however, participants high in paranormal or religious involvement were not expected to exhibit external control (see Benassi et al., 1979; McGarry & Newberry, 1981; Shrauger & Silverman, 1971).

Method

Participants

The sample consisted of 248 participants (62% female). Of these participants, 64% were aged 18-24, 25% were aged 25-39, and 11% were older than 40. Further, 29% were Catholic, 29% were Protestant/Methodist/Baptist, and 32% had no religious affiliation or labeled themselves “spiritual”.

Geographically, 64% were from the northeastern part of the United States. In terms of education, 39.5% had completed college (only 7% had stopped their education after high school). When participants were asked to rate their own psychic abilities (from 1 = don’t have any to 10 = excellent), only 51% said they didn’t have psychic abilities and 12.5% rated their psychic abilities above a 5 ($M = 2.29$, $SD = 1.85$). Additionally, 55.3% of participants had used a psychic service at least once ($M = 1.58$, $SD = 1.83$) and 31.9% had performed at least one psychic service such as tarot card or palm reading ($M = .65$, $SD = 1.26$).

Materials

Study 3 used a between subjects design. Participants were given 10 trials and asked to select the target object(s) out of 8 objects such as playing cards, cases containing money, doors behind which were prizes and so on. The probability of success was either 1:8 (Condition 1 – Low Probability) or 7:8 (Condition 2 –High Probability). On each trial, as in Study 1, the participants were told they could either pick a card themselves or have somebody else choose a card for them. The “somebody else” was an individual reported as having psychic abilities.

Participants were also asked to complete several questionnaires. The 20-item Belief in the Paranormal Scale (Jones, Russell, & Nickel, 1977; modified by Presson & Benassi) was administered to assess paranormal beliefs. The scale includes 20 items on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The range of possible scores is 20 -100. The scale taps participants' beliefs about psychic phenomena in general, ESP, telepathy, and precognition. Seven of the questions were designed to tap self-paranormal abilities. For example, "I believe that I can project my thoughts to another person." Reliability of the scale was high ($\alpha = .94$). To assess paranormal involvement, the self-paranormal ability subscale was used. In addition, participants were asked if they had ever used psychic services as well as whether they had ever performed psychic services (such as palm reading or tarot reading).

To assess participants' control orientation, they were also given the Internality, Powerful Others, and Chance Scale (Levenson, 1981). The scale comprises 24 items on a 6-point Likert scale ranging from -3 = strongly disagree to +3= strongly agree. The scale is divided into 3 subscales comprised of 8 items each (e.g., internality, powerful others, and chance). With the addition of a constant of 24 to each subscale to eliminate negative scores, the range of possible scores on each scale is 0 – 48. An example of an item from the internality subscale is, "I can pretty much determine what happens in my life"; from the powerful others scale, "I feel like what happens in my life is mostly determined by powerful people"; and from the chance scale, "To a great extent

my life is controlled by accidental happenings.” Reliability of the internality scale was low ($\alpha = .64$). Reliabilities of the powerful others scale ($\alpha = .74$) and chance scale ($\alpha = .72$) were moderate.

Religiosity was assessed using the 12-item Religiousness Scale (Strayhorn, Weidman, & Larson, 1990). Most of the items use a 5-point Likert scale, although some items use a 6-point scale with various selection choices depending in the question being asked. For example, the question, “How religious would you say you are?” is rated from 1 = Not all to 5 = Very much. The question, “On the average, how often have you attended religious worship services (i.e., Sunday morning, evening, and/or other days) during the last year?” was rated using the choices: Never, a few times a year, only on Holidays, once or twice a month, weekly or almost weekly, more than once a week. The scores could range from 12 – 61. The reliability of the scale was high ($\alpha = .93$). Religious involvement was assessed using the worship attendance and the frequency of prayer questions.

Additionally, to control for context effects, after completing the online experiment portion of this study, participants completed several distraction tasks including word jumbles and the Morally Debatable Behaviors Scale (Harding & Phillips, 1986). Participants were also asked demographic information including age, education, gender, psychic services used, psychic services performed, and their own perceived psychic ability. Finally, participants were also asked to indicate the actual probability that they would have been able to select the correct target object.

Procedure

The procedure used in Study 3 replicated that of Study 1 and Study 2. In Study 3, however, students were also recruited from several psychology classes on campus and were given extra credit by their professors for their participation. Each participant was given a unique ID, which was not linked to any personal information, ensuring complete anonymity of participants. Furthermore, the researcher opted not to collect IP addresses, which could be used to track participants. Data and participants information for the prize drawing also remained separate.

Participants were told they were participating in an experiment researching the cognitive processes involved in online gambling. All participants were told they would be entered into a drawing to win a \$25 online gift certificate. After completing the experiment (approximately 10-15 minutes), participants indicated their judgment of the probability they could choose a target object successfully and then completed the Moral Behaviors Scale, several word jumbles, and the Belief in the Paranormal Scale, Internality, Powerful Others, and Chance scale, Religiousness Scale, and then answered several demographic questions. When participants hit the "done" button, they were brought to a page that was separate from the experimental survey. This page included the debriefing form and a drawing entry form. Participants who wanted to enter the drawing were asked to fill in their personal information including name and email address. Again, data and personal information remained entirely separate.

Results

To evaluate if participants varied in their selection of the psychic based upon probability using a between-subjects design, an ANOVA was conducted with condition as the independent variable and total number of psychic selections as the dependent variable. There was a significant effect of condition ($F(1,239) = 29.86, p < .001$). Participants in the low subjective probability condition were more likely to choose the psychic ($M = 3.07, SD = 3.43$) than participants in the high subjective probability condition ($M = 1.07, SD = 1.76$) (Figure 3).

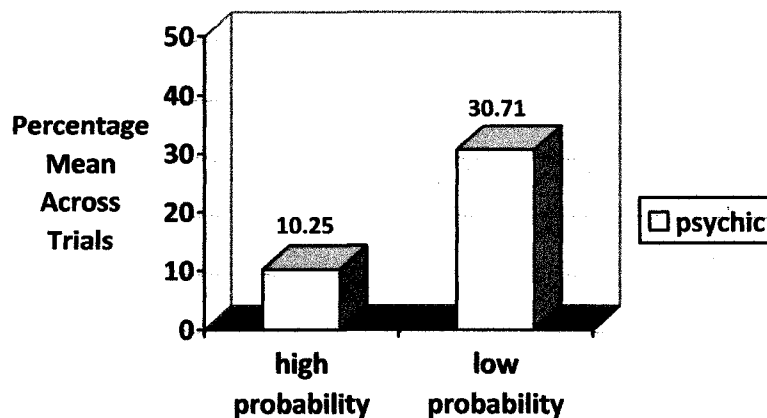


Figure 3: Strategy selection by subjective probability

To evaluate whether participant demographics, the scales, and participants' judgments of probability (overestimation versus correct) were related in the overall sample, bivariate correlations were conducted (Table 1). The paranormal involvement items were broken down into two factor scores: the 7 self-belief items from the paranormal beliefs scale and the 8 items indicating

performance of a psychic service were forced onto one factor score labeled personal involvement ($\alpha = .84$) and the 8 items indicating general use of a psychic service in the past were forced onto one factor score labeled general involvement ($\alpha = .62$). Religious involvement was assessed using the total score for frequency of worship attendance and frequency of prayer.

There were no correlations between gender and any of the paranormal or religious variables. There was a negative correlation between age and religious affiliation as well as between age and religiosity. Younger participants were less likely than older participants to be religious. There was a positive correlation between age and general paranormal involvement. Older participants were more generally involved in their paranormal beliefs (i.e., having used a psychic). There was a negative correlation between education and paranormal beliefs as well as between education and personal paranormal involvement. Participants with less education were more likely to endorse paranormal beliefs and be personally involved in these beliefs (i.e., performing psychic services). Participants with less education were also more likely to believe in powerful others and to believe in chance. Not surprisingly, there was a negative correlation between education and probability assessment. Participants who had less education were more likely to overestimate the probability of choosing a target object successfully.

There was a negative correlation between religious involvement and internality. Participants who were more religiously involved were less likely to exhibit internal control. There was also a positive correlation between paranormal beliefs and belief in chance as well as between personal involvement and belief

in chance. Participants who endorsed paranormal beliefs and participants who were personally involved in those beliefs were more likely to believe in chance. Finally, there was a positive correlation between paranormal beliefs and probability judgment as well as between the paranormal involvement variables and probability judgment. Participants who endorsed paranormal beliefs as well as those who were personally or generally involved in their paranormal beliefs were more likely to overestimate the probability of correctly guessing a target object.

Table 1: Bivariate Correlation Matrix of Demographics, Correct Probability Judgment, and Scales

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Gender													
2. Age	-.290**												
3. Education	.016	-.579**											
4. Affiliation	-.070	-.230*	.225*										
5. Religiosity	.068	-.226*	-.061	-.438**									
6. Rel. Involve	.033	-.179	.058	-.387**	.874**								
7. Par. Beliefs	.098	.010	-.261**	-.106	.180	.016							
8. PI	.079	-.090	-.248**	.028	.130	-.048	.823**						
9. GI	.090	.205*	.072	.013	.041	.023	.327**	.335**					
10. Internal	-.032	.074	-.028	.078	-.173	-.192*	.052	.051	-.025				
11. BPOS	-.109	-.070	-.185*	-.009	.058	.066	.042	.109	.025	-.086			
12. BCS	-.051	-.097	-.303**	-.114	-.092	-.127	.194*	.255**	-.026	-.247**	.553**		
13. Probability	-.035	-.016	-.181*	.067	.077	.030	.251**	.305**	.190*	-.034	-.109	-.017	

Note: * $p < .05$, ** $p < .01$; PI = personal paranormal involvement, GI = general para. involvement, BCS = Belief in Chance, BPOS = Belief in Powerful Other

A standard multiple regression was conducted to assess whether paranormal beliefs and paranormal involvement would predict total psychic selection (See Table 2). The total number of times the psychic was selected on the ten trials was used as the predicted variable and the following variables were used as predictor variables: general paranormal beliefs (i.e., the total of the paranormal belief scale without the inclusion of the self-belief items was converted into a z-score), personal involvement (i.e., performing psychic services and belief in personal psychic ability), general involvement (i.e., using a psychic service in the past), as well as the interaction terms for paranormal beliefs by personal involvement, and paranormal beliefs by general involvement. The high probability condition lacked variability (the psychic was only chosen 10% of the trials); therefore, it was excluded from analyses.

The overall regression for the low probability condition was statistically significant, $R = .379$, $R^2 = .144$, adjusted $R^2 = .105$, $F(5, 110) = 3.69$, $p = .004$. To assess the statistical significance of the contributions of individual predictors, the t ratios for the individual regression slopes were examined. Three of the five predictors were significantly predictive of total psychic selection; these included paranormal beliefs, $t(110) = 2.58$, $p = .011$; personal involvement, $t(110) = -2.22$, $p = .029$; and general involvement, $t(110) = 2.60$, $p = .011$. The nature of the predictive relation of paranormal beliefs was as expected; the positive sign for the slope indicated that participants with higher scores on the paranormal belief scale chose the psychic more often than participants with lower scores. The

Table 2: Results of Standard Multiple Regression to Predict Total Psychic Selection From Paranormal Beliefs, Personal Involvement, and General Involvement.

	TPS	GPB	PI	GI	b	β	sr^2_{unique}
GPB	.178				2.98*	.417	.05
PI	.055	.823			-1.35*	-.382	.04
GI	.271	.327	.335		.905*	.248	.05
Mean	3.26	-.180	-.112	.209			
SD	3.57	1.09	1.02	.980			
$R^2 = .144$							
$R^2_{\text{adj}} = .105$							
$R = .379$							

Note: * $p < .05$, ** $p < .01$, TPS = Total Psychic Selection, GPB = General Paranormal Beliefs, PI = Personal Involvement, and GI = General Involvement. TPS based upon selection out of 10 trials. GPB, PI, and GI are standardized scores with mean of 0.

predictive relation of personal involvement was also as expected; the negative sign for the slope indicated that participants who were more personally involved in their paranormal beliefs (i.e., believing they had their own psychic abilities as well as performing psychic services) relied on the psychic less often than participants with lower scores. Finally, the nature of the predictive relation of

general paranormal involvement (i.e., using a psychic service in the past) was also as expected; the positive sign for the slope indicated that participants scoring higher on general involvement chose the psychic more often than participants scoring lower. There were no significant interactions between paranormal beliefs and paranormal involvement.

A standard multiple regression was conducted to assess whether religious beliefs and religious involvement would predict total psychic selection (See Table 3). The total number of times the psychic was selected out of ten trials was used as the predicted variable and the following variables were used as predictor variables: religious beliefs (median split into high and low groups), religious involvement (i.e., frequency of worship attendance and frequency of prayer totaled and then median split into high and low), as well as the interaction term for religious beliefs by religious involvement. The high probability condition lacked variability (the psychic was only chosen 10% of the trials); therefore, it was excluded from analyses.

The overall regression for the low probability condition was not statistically significant, $R = .206$, $R^2 = .042$, adjusted $R^2 = .016$, $F(3, 107) = 1.58$, $p = .198$. Religious involvement did, however, emerge as a significant predictor variable, $t(107) = -2.07$, $p = .041$. The predictive nature of religious involvement to total psychic selection was as expected; participants who were less religiously involved chose the psychic more often than participants who were more religiously involved.

Table 3: Results of Standard Multiple Regression to Predict Total Psychic Selection From Religious Beliefs and Religious Involvement.

	TPS	RB	RI	b	β	sr^2_{unique}
RB	-.007			.789	.111	.01
RI	-.183	.496		-1.68*	-.237	.04
Mean	3.31	1.51	1.50			
SD	3.55	.502	.502			
$R^2 = .042$						
$R^2_{\text{adj}} = .016$						
$R = .206$						

Note: * $p < .05$, ** $p < .01$, TPS = Total Psychic Selection, RB = Religious Beliefs, RI = Religious Involvement. TPS based upon selection out of 10 trials. RB and RI are standardized scores with a mean of 0.

To assess whether participants' judgments of probability affected their choice to rely on the psychic, an ANOVA was conducted using total number of times the psychic was chosen as the independent variable and probability judgment (-1 = underestimation, 0 = correct, and 1 = overestimation) as the dependent variable. As predicted, there was a significant main effect for probability judgment: $F, (2, 233) = 4.63, p = .011, \eta_p^2 = .038$. Tukey post hoc

comparisons revealed that participants who overestimated the probability of guessing the target's location successfully ($M = 3.17$, $SD = 3.36$) chose the psychic significantly more often than participants who underestimated the probability of success ($M = 1.37$, $SD = 2.08$). To evaluate whether controlling for education would eliminate this effect, partial correlations between probability judgment, total psychic selection, and education were computed. Controlling for education did not eliminate the significant correlation between total psychic selection and probability judgment ($r = .183$, $p = .007$).

Finally, a standard multiple regression was conducted to assess whether participant demographics and the control subscales would predict total psychic selection. The total number of times the psychic was chosen over ten trials was used as the independent variables and the following variables were used as predictor variables: Gender (0 = female, 1 = male), Age (0 = older than 25, 1 = 18-24), Education (0 = high school, 1 = college or higher), Religious Affiliation (0 = none/other, 1 = traditional religion), and the Internality, Powerful Others, and Chance subscales. The overall regression for the low probability condition was statistically significant, $R = .354$, $R^2 = .126$, $R^2_{adj} = .072$, $F(7, 114) = 4.42$, $p < .001$. To assess the contributions of individual predictors, the t ratios for the individual regression slopes were examined. Only one of the seven predictors significantly predicted of total psychic selection; this predictor was belief in chance, $t(114) = 2.18$, $p = .031$, $b = .158$, $\beta = .248$, $sr^2_{unique} = .04$. The predictive relation of belief in chance to psychic selection was as expected; participants

who more strongly exhibited a belief in chance chose the psychic more often than participants who less strongly exhibited a belief in chance.

Discussion

The first hypothesis that the results from the first two studies would be replicated using a between-subject design in Study 3 was supported. Participants in the low probability of success condition (i.e., under conditions of uncertainty) were more likely to choose the psychic strategy than participants in the high probability of success condition.

The hypothesis that participants with higher paranormal beliefs would choose the psychic more often than those with lower beliefs was supported. Further, the hypotheses related to paranormal involvement were both supported. Participants with more personal paranormal involvement chose the psychic less often than did participants with less involvement. These participants had performed a psychic service in the past and were also more likely to believe that they had their own psychic ability. It is not surprising that they would believe they could predict the hidden object's location. On the other hand, participants with more general paranormal involvement chose the psychic more often than those with less general involvement. These participants have used a psychic service in the past, so it is also not surprising that they would expect the psychic to be able to predict the object's location given their past experiences.

The hypothesis that higher paranormal beliefs would be positively associated with higher religious beliefs was not supported; there was no association between any of the paranormal variables and any of the religious

variables. Although the overall regression to predict total psychic selection from the religious variables was not statistically significant, the hypothesis that higher religious involvement would be associated with choosing the psychic less often was supported. Participants who were less religiously involved chose the psychic less often than participants who were more involved.

Contrary to past research and the study hypotheses, results from Study 3 indicated that men and women did not differ in their endorsement of paranormal beliefs (Vyse, 1997) or religious beliefs (Stark, 2002). Women and men did not differ significantly in terms of paranormal beliefs, religious beliefs, involvement, or how often they chose the psychic strategy.

In partial support of the hypothesis that age would be significantly associated with beliefs and involvement, younger participants were less likely to be religious; however, age was not associated with religious involvement. Younger participants were also more generally involved in their paranormal beliefs than older participants; this result was not expected, but may be due to the availability of psychic services at campus events and as campus entertainment. Age was not associated with personal paranormal involvement. These findings concerning age are important given that many past studies have been conducted using samples of college students. This research supports past research that younger individuals are less religious than older individuals; however, it also supports past research that age is not positive correlated with paranormal beliefs (Göriz & Schumacher, 2000; Haraldsson, 1981). However,

age was negatively correlated with general paranormal involvement, but in the opposite direction of what was expected.

Contrary to the hypothesis that religious involvement would be related to greater internal control, participants who were less religiously involved were more likely to exhibit internal control. This finding may be explained by the argument that religious involvement in the form of worship attendance and prayer are methods that some individuals use to defer to God. Deference to God discourages personal control (Ai et al., 2005).

There was, however, a significant positive relation between general paranormal beliefs and the belief in chance as well as personal paranormal involvement and the belief in chance. These findings can be discussed in one of two ways. First, this finding partially supports past research and the study hypothesis that an *external* locus of control would be associated with greater paranormal beliefs (Allen & Lester, 1994; Groth-Marnat & Pegden, 1998; Jahoda, 1970; Scheidt, 1973; Snel & Sijde, 1997; Tobacyk & Milford, 1983; Tobacyk, Nagot, & Miller, 1988). However, this explanation runs counter to the hypothesis that individuals who are more personally involved in their paranormal beliefs and believe that they have their own psychic abilities would exhibit internal control. Another way to explain these findings requires taking a closer look at Levenson's (1981) chance subscale. One could argue that the chance subscale is actually a measurement of luck.

Luck and chance are two distinct concepts (Friedland, 1998; Wagenaar & Keren, 1988). Chance can be thought of as a mechanism occurring in the

environment; therefore, chance is an external factor (Friedland, 1988) or random event (Wohl & Enzle, 2002). Luck, on the other hand, is seen as an internal factor, which can be manipulated (Friedland, 1998) and may lead to an illusion of control (Wagenaar & Keren, 1988). Luck-oriented persons see luck as a skill to be mastered (Wohl & Enzle, 2002). If one views Levenson's (1981) scale as a measure of luck than participants exhibit higher paranormal beliefs and personal involvement actually would have been more likely to believe that the card-guessing task involved luck – an internal factor.

Finally, the hypothesis that overestimating the probability of choosing a target's location successfully (i.e., an illusion of prediction) would be related positively to psychic selection as well as to religious and paranormal beliefs was supported. Participants who overestimated their probability of success chose the psychic significantly more often than participants who underestimated their probability of success. These results support the hypothesis that participants would choose the psychic more often based upon an illusion of prediction; the belief that the psychic was better able to predict target objects. Overestimation of probability was also positively related to paranormal beliefs and both paranormal involvement variables. Although participants with more education were less likely to endorse paranormal beliefs and to be personally involved as well as more likely to judge probability accurately, controlling for education did not eliminate the significant positive relation between psychic selection and probability judgments. These results are partially supportive of the probability misjudgment theory (Blackmore & Troscianko, 1985; Blagrove et al., 2006; Matthews &

Blackmore, 1995; Sutherland, 1992) that paranormal beliefs cause individuals to misjudge probability; however, these results were not directly related to paranormal beliefs but rather to choosing a psychic strategy under conditions of uncertainty. Participants who misjudged probability were more likely to choose the psychic if they overestimated probability and less likely to choose the psychic if they underestimated probability. These results indicate that participants exhibited an illusion of prediction related to the psychic's abilities.

CHAPTER IV

GENERAL DISCUSSION

The present research aimed to expand the investigation of paranormal and religious beliefs in relation to illusory judgments by assessing the illusion of prediction in an experimental card-guessing task. Another purpose of this research was to determine whether religious and paranormal beliefs were related and to expand upon research by determining if religious beliefs could also be related to illusory judgments. Another purpose of this dissertation was to ascertain whether errors in reasoning such as probability over or underestimation as well as perceived control would predict participants' selection of the psychic strategy.

Study 1 explored the experimental paradigm and found that participants were more likely to rely on a paranormal strategy under conditions of uncertainty. Study 2 expanded upon Study 1 by determining whether the addition of a third choice would eliminate paranormal strategy selection. Results indicated that participants still relied more on the paranormal strategy under conditions of uncertainty even when allowed a third choice strategy. The results of the first two studies indicated that the paranormal strategy selection was pervasive under conditions of uncertainty. Questions were raised about the individual differences

of participants who consistently selected the psychic strategy as opposed to choosing their own target object.

Study 3 was conducted using a between-subjects design to evaluate whether the results from Study 1 and Study 2 (based upon within-subjects designs) would replicate. Further, Study 3 examined demographics as well as the ability to judge probability successfully and individual difference variables such as paranormal beliefs and religious beliefs. The results from Study 3 replicated those in Study 1 and Study 2. Participants were more likely to choose the psychic's selection under the condition of uncertainty.

The finding that participants chose the psychic more often under conditions of uncertainty was linked to inaccurate probability judgments and was partially supportive of past research indicating that paranormal beliefs are associated with misjudgment of probability (Blackmore & Troscianko, 1985; Blagrove et al., 2006; Matthews & Blackmore, 1995; Sutherland, 1992). In this research, however, it was not paranormal beliefs that were associated with probability misjudgment, but rather selection of a paranormal strategy. Participants who overestimated the probability of choosing the correct object location chose the psychic more often than those who underestimated probability. It all likelihood, it was not that probability misjudgments led to choosing the psychic, but rather that choosing the psychic led to probability misjudgments. Participants who chose the psychic numerous times overestimated the probability that they chose the option that would be successful (i.e., choosing the psychic). These findings were not eliminated after controlling

for education as would be predicted from past research (Bressan, 2002; Musch & Ehrenberg, 2002), suggesting that participants exhibited an illusion of prediction; they believed that the psychic was better able to predict hidden objects in a condition with low probability of success.

It might be argued that participants were simply deflecting responsibility to another individual (e.g., the psychic) when their probability of failure was high; however, Case and colleagues (2004) addressed this issue by including two other possible choices for selection strategy. In their study, participants were given the choice of a psychic's, academic's, or student's preexisting selections. Participants were still more likely to choose the psychic than the academic or student, indicating that participants were not simply responding based upon attributional biases (Case et al., 2004).

The results of this dissertation further emphasize the need to consider paranormal involvement in studies of paranormal beliefs (Benassi et al., 1979; Irwin, 1993; McGarry & Newberry, 1981; Messer and Griggs, 1989). Participants with higher personal paranormal involvement and those with higher religious involvement chose the psychic less often than participants with less paranormal or religious involvement. General paranormal involvement, however, was associated with choosing the psychic more often. Participants with higher paranormal involvement were those who believed that they possessed psychic ability; as such it would not make sense for them to choose the psychic's selections. To some extent, it was surprising that personal paranormal

involvement was not related to internality; however, an alternative explanation regarding Levenson's (1981) chance subscale may account for this finding.

As argued in the discussion for Study 3, Levenson's (1981) chance subscale may actually be a measurement of luck (for example, an item from this scale is, "When I get what I want, it's usually because I am lucky"). Researchers have found a significant positive association between belief in luck and belief in chance (Darke & Freedman, 1997). If the chance subscale is evaluated as actually representing chance, then this research supports past research that external control is associated with paranormal beliefs (Allen & Lester, 1994; Groth-Marnat & Pedgen, 1998; Jahoda, 1970; Scheidt, 1973; Tobacyk & Milford, 1983; Tobacyk et al., 1988). However, if the chance subscale is evaluated as representing luck then paranormal beliefs and personal paranormal involvement are associated with an internal, controllable, skill factor (Friedland, 1998; Wagenaar & Keren, 1988; Wohl & Enzle, 2002).

Another important implication of this research relates to the findings regarding age. Although age was not associated with paranormal beliefs, which supports past research (Göritz & Schumacher, 2000; Haraldsson, 1981), it was associated with religious beliefs and paranormal involvement. Younger participants were less religious and less likely to be personally involved in their paranormal beliefs; however, younger participants were more likely to be generally involved in their paranormal beliefs. As previously discussed, younger participants may have more opportunities to use psychic services on their college campuses. Campus activity boards often book psychic entertainment such as

palm readers, fortunetellers, or mediums for small and large-scale events. The results regarding age are important given that much of the data related to paranormal beliefs has been drawn from undergraduate college samples. These results support past research that involvement is an important variable and that undergraduates differ from the general population in their levels of involvement (McGarry & Newberry, 1981; Messer & Griggs, 1989).

This research is also theoretically important in its contribution to the religious research literature. Participants who were more religiously involved were actually less likely to exhibit internal control. This finding contrasts that of Shrauger and Silverman (1971) who found that religious involvement was associated with greater internal control; however, in their research, church attendance was the only variable related to involvement and the effect was only significant for women. Religious involvement in this study was measured using worship attendance as well as frequency of prayer. Further, given that there were no sex differences for the endorsement of paranormal beliefs or religious beliefs, a sex difference related to involvement and control would not be expected.

This research also contributes to the literature regarding religion and illusory judgments. Participants who were more religiously involved were less likely to choose the psychic than those who were less religiously involved. These results indicate that religiously involved participants were less likely to make illusory judgments of prediction regarding the psychic's ability.

There were limitations related to the studies conducted in this dissertation. First, the experimental design might have lacked mundane realism and, therefore, might not generalize to situations outside of the experiment. Furthermore, participants might have been able to easily determine the purpose of the research (especially with the inclusion of a psychic as a strategy offered). Suspicion about the psychic could have lead participants to choose their own cards instead of relying on the psychic. Future research should include a control manipulation that measures participant suspicion.

Additionally, this Internet research limited the available number of questions that could be asked in order to avoid participant dropout. It would have been useful to include two measures of control including Rotter's (1966) bi-dimensional scale of internal and external control in addition to a second measure of paranormal beliefs such as the revised Paranormal Belief Scale (PBS-R; Tobacyk, 1988). The PBS-R taps psi phenomena in addition to beliefs about witchcraft and traditional religious beliefs. There are also sample issues that must be taken into account with online research such as repeat responders and non-serious responses. However, comparative analyses of traditional methods versus Internet methods indicate that non-serious and/or repeat responders do not affect data significantly (Gosling, Vazire, Srivastava, & John, 2004). Gosling and colleagues (2004) argued that Internet findings are consistent with findings from traditional methods and pose no serious issues in validity or reliability beyond those found in traditional studies; however, Internet studies offer the additional advantage of a more diverse sample.

Another limitation involves the question about the psychic services used. The use of psychic services is not necessarily indicative of involvement in the paranormal. Many college campuses offer entertainment to students in the form of persons claiming to be psychics. It is not surprising that many participants had used at least one psychic service. It may have been more telling to ask participants how many services they had used in addition to how often they have used these services. Future research may also want to inquire as to how often participants watch television show related to the paranormal such as shows where David Blaine or Criss Angel purport to be able to do extraordinary feats.

Future research should also examine paranormal strategy selection after positive affect mood inducements to determine if strategy and paranormal beliefs are related to the experiential system, especially given recent findings that paranormal believers are just as able as skeptics to regulate their emotional coping (Rogers, Qualter, Phelps, & Gardner, 2006). High paranormal believers may be individuals who have perceived paranormal phenomena and relied on the experiential/intuitive system to process these phenomena. This reliance on the experiential system may have caused them to label these events as valid (King et al., 2007); therefore, high believers might be even more likely to believe that the psychic is able to predict chance events.

It might also be worthwhile to examine other experimental manipulations related to this dissertation's experimental paradigm. For example, participants might be asked to wager money on each trial. It would be interesting to examine whether participants' strategy selections change in relation to gambling

manipulations. This research could also be conducted using mood manipulations to determine if more positive affect would be related to greater reliance on the psychic strategy under conditions of uncertainty even when participants are asked to wager money on low probability trials.

In conclusion, this research contributes a wider body of research related to religious and paranormal beliefs. The findings support past research by emphasizing the need to consider paranormal and religious involvement in studies of paranormal and religious beliefs (Benassi et al., 1979; Irwin, 1993; McGarry & Newberry, 1981; Messer & Griggs, 1989; Shrauger & Silverman, 1971). Further, this research adds to past literature regarding probability judgments and errors in reasoning in relation to paranormal beliefs (Blackmore & Troscianko, 1985; Blagrove et al., 2006; Brugger et al., 1990; Dagnall et al., 2007; Gray & Mill, 1990; Roberts & Seager, 1999; Sutherland, 1992; Wierzbicki, 1985). In this research, participants who chose the psychic more often also overestimated the probability that a target's location could be predicted successfully.

This research is theoretically important because it closes some gaps in the literature concerning religion and illusory judgment. Participants who were more religiously involved were less likely to choose the psychic. Further, religious involvement was negatively associated with perceived internal control.

Although past researchers have stated that they were measuring control, some were actually measuring other illusory judgments (Presson & Benassi, 1996); this research is among the only research to connect paranormal and

religious beliefs to illusory prediction. This research is also theoretically important regarding the relation between involvement, beliefs, and illusory judgments. Past research has not differentiated between personal and general involvement in terms of paranormal beliefs. This research has shown that personal paranormal involvement results in very different results compared to general paranormal involvement. Participants who were more personally involved chose the psychic less often, whereas participants who were more generally involved chose the psychic more often.

In addition to theoretical implications, there are also implications for the area of gambling as well as everyday paranormal experiences. Use of a paranormal strategy (i.e., a “psychic” or, more likely, perceived personal psychic abilities) may lead some individuals to gamble beyond their means, especially if they believe that chance games are simply a matter of luck – a skill factor that can be improved or manipulated (Friedland, 1998; Wagenaar & Keren, 1988; Wohl & Enzle, 2002). Furthermore, during times of uncertainty (i.e., life seems unpredictable or during times of negative life experiences), people may be particularly vulnerable to individuals who claim to have psychic abilities such as psychic hotline operators or fortunetellers. Use of psychic hotlines and call numbers may not seem like an important facet of American life until one considers that the psychic industry earns well over a billion dollars every year (Nickel & Nisbett, 1998). Given the prevalence of religious and paranormal beliefs and the billion dollar industries that have sprung up to take advantage of

people's vulnerabilities based upon these beliefs, it is important that researchers study the errors in decision making that result from non-scientific beliefs.

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APPENDICES

APPENDIX A: EXPERIMENTAL TASK/MEASURES

Directions given to participants for experiment

This is a card game. Your task will be to obtain the HIGHEST SCORE possible by CORRECTLY answering questions about hidden objects.

For example, you will be presented with 8 hidden cards and asked to pick a RED card from the 8. You will also be given some information about the 8 cards. For example, "1 of the 8 cards is a RED card."

You are COMPETING against other individuals so it is IMPORTANT TO DO AS WELL AS YOU CAN.

When we have given this task to others in the past we have found that people find it easier to occasionally follow the choices made by others.

In this experiment, we placed an ad for a person who claimed to have the ability to know the correct card without seeing it. We tested this person's psychic abilities and found that this person was, in fact, quite good.

The same questions that were asked of the psychic will now be asked of you. However, unlike the psychic, you may choose to use the psychic's answer instead of selecting a card yourself.

If you choose the psychic's answer and the psychic was right then you will also be correct. If you choose the psychic's answer and the psychic was wrong then you will also be wrong.

For each question, you will be given the same information as the psychic. You must then choose between the psychic's answer or select from one of the objects presented on your own.

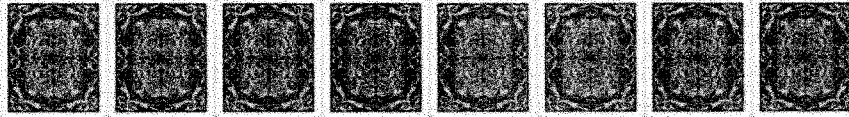
REMEMBER, YOU MUST TRY TO DO AS WELL AS YOU CAN. THIS IS A COMPETITION!

There are 10 questions to complete in this section. Check off the correct box to indicate your answer. You must pick an object to move on to the next question.

PLEASE MAKE SURE YOU READ EACH OF THE QUESTIONS THOROUGHLY.

Study 3A: Dissertation

1. 1 of the 8 cards is a CLUB. You must pick a CLUB from the 8 cards presented OR choose the psychic's answer.



- ☐ I choose the psychic's selection
- ☐ Card 1
- ☐ Card 2
- ☐ Card 3
- ☐ Card 4
- ☐ Card 5
- ☐ Card 6
- ☐ Card 7
- ☐ Card 8

4. Question 2

Please choose the correct target object or rely on the psychic's selection.

1. 1 of the 8 cases contains 1 million dollars. Please choose the correct case.



- ☐ I choose the psychic's selection
- ☐ Suitcase 1
- ☐ Suitcase 2
- ☐ Suitcase 3
- ☐ Suitcase 4
- ☐ Suitcase 5
- ☐ Suitcase 6
- ☐ Suitcase 7
- ☐ Suitcase 8

5. Question 3

Please choose the correct target object or rely on the psychic's selection.

Study 3A: Dissertation

1. Behind 1 of the 8 doors is a new LCD television. Choose the correct door.



- ☐ I choose the psychic's selection
- ☐ Door 1
- ☐ Door 2
- ☐ Door 3
- ☐ Door 4
- ☐ Door 5
- ☐ Door 6
- ☐ Door 7
- ☐ Door 8

6. Question 4

Please choose the correct target object or rely on the psychic's selection.

1. 1 of the 8 cards is a Queen. Please choose a QUEEN.



- ☐ I choose the psychic's selection
- ☐ Card 1
- ☐ Card 2
- ☐ Card 3
- ☐ Card 4
- ☐ Card 5
- ☐ Card 6
- ☐ Card 7
- ☐ Card 8

7. Question 5

Please choose the correct target object or rely on the psychic's selection.

Study 3A: Dissertation

1. 1 of the envelopes contains \$1000. Please choose the correct envelope.

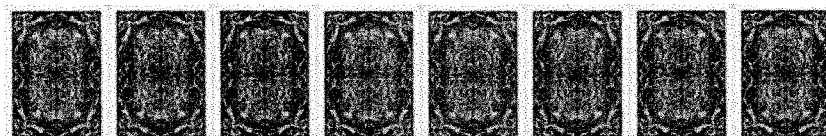


- ☐ I choose the psychic's selection
- ☐ Envelope 1
- ☐ Envelope 2
- ☐ Envelope 3
- ☐ Envelope 4
- ☐ Envelope 5
- ☐ Envelope 6
- ☐ Envelope 7
- ☐ Envelope 8

8. Question 6

Please choose the correct target object or rely on the psychic's selection.

1. 1 of the 8 cards is a diamond. Please choose a DIAMOND.



- ☐ I choose the psychic's selection
- ☐ Card 1
- ☐ Card 2
- ☐ Card 3
- ☐ Card 4
- ☐ Card 5
- ☐ Card 6
- ☐ Card 7
- ☐ Card 8

9. Question 7

Please choose the correct target object or rely on the psychic's selection.

Study 3A: Dissertation

1. Behind 1 of the 8 doors is a new sportscar. Please choose the correct door.



- ☐ I choose the psychic's selection
- ☐ Door 1
- ☐ Door 2
- ☐ Door 3
- ☐ Door 4
- ☐ Door 5
- ☐ Door 6
- ☐ Door 7
- ☐ Door 8

10. Question 8

Please choose the correct target object or rely on the psychic's selection.

1. 1 of the 8 suitcases contains \$10,000. Please choose the correct suitcase.



- ☐ I choose the psychic's selection
- ☐ Case 1
- ☐ Case 2
- ☐ Case 3
- ☐ Case 4
- ☐ Case 5
- ☐ Case 6
- ☐ Case 7
- ☐ Case 8

11. Question 9

Please choose the correct target object or rely on the psychic's selection.

Study 3A: Dissertation

1. 1 of the 8 cards is a spade. Please choose a SPADE.



- ☐ I choose the psychic's selection
- ☐ Card 1
- ☐ Card 2
- ☐ Card 3
- ☐ Card 4
- ☐ Card 5
- ☐ Card 6
- ☐ Card 7
- ☐ Card 8

12. Question 10

Please choose the correct target object or rely on the psychic's selection.

1. 1 of the 8 envelopes contains the keys to a new house. Please choose the correct envelope.



- ☐ I choose the psychic's selection
- ☐ Envelope 1
- ☐ Envelope 2
- ☐ Envelope 3
- ☐ Envelope 4
- ☐ Envelope 5
- ☐ Envelope 6
- ☐ Envelope 7
- ☐ Envelope 8

13. Probability

Study 3A: Dissertation

1. My probability of guessing a correct target object in any of the previous questions was approximately:

- ☐ 100%
☐ 85%
☐ 75%
☐ 60%
☐ 50%
☐ 35%
☐ 25%
☐ 10%
☐ 0%

14. Questionnaire 1

You have completed the guessing portion of the study. Now we have some additional questions for you to answer. Please complete each of the questionnaires and assignments. Thank you.

Please tell me for each of the following statements whether you think it can always be justified, never be justified, or something in between.

1. Claiming state benefits that you are not entitled to

2. Avoiding a fare on public transport

3. Cheating on taxes if you have the chance

4. Buying something you knew was stolen

5. Taking and driving away a car belonging to someone else (joyriding)

6. Smoking marijuana

7. Keeping money that you have found

8. Lying in your own interest

9. Married men or women having an affair

Study 3A: Dissertation**2. What is your age?**

- ☐ 18-24
☐ 25-31
☐ 32-38
☐ 39-45
☐ 46-52
☐ Older than 52

3. Where are you from?

- ☐ Northeast
☐ Southeast
☐ Midwest
☐ West
☐ South
☐ Outside of the United States

4. What is your education?

- ☐ Some or Completed Highschool
☐ Some College
☐ Completed College
☐ Some Graduate Education
☐ Graduate degree (i.e., PhD, MA, MD, etc...)

5. What is your religion?

- ☐ Catholic
☐ Christian (Protestant, Methodist, Baptist, etc...)
☐ Evangelical Christian
☐ Jewish
☐ Muslim
☐ Buddhist
☐ Hindu
☐ Wiccan/Pagan
☐ Other

Other (please specify)

Study 3A: Dissertation**6. Have you ever used the following services? Please check ALL that apply.**

- ☐ Tarot reading
- ☐ Palm reading
- ☐ Fortune reading
- ☐ Scrying (crystal ball)
- ☐ Handwriting analysis
- ☐ Dream analysis
- ☐ Medium services (communication with deceased)
- ☐ Ouija board
- ☐ Other psychic service
- ☐ Never used a psychic

7. Have you ever performed any of the following services? Please check ALL that apply.

- ☐ Tarot reading
- ☐ Palm reading
- ☐ Fortune reading
- ☐ Scrying (crystal ball)
- ☐ Handwriting analysis
- ☐ Dream analysis
- ☐ Medium services
- ☐ Ouija board
- ☐ Other psychic service
- ☐ Never performed any of these

8. Please rate your own psychic abilities on a scale of 1 (I don't have any) to 10 (I am an excellent psychic). **9. In the past year, how often have you engaged in gambling activities (i.e., playing cards for money, playing at a casino, etc...)?**

- ☐ Never
- ☐ Rarely (1 or 2 times a year)
- ☐ Occasionally (3 or 4 times a year)
- ☐ Moderately (every few months)
- ☐ Frequently (1 or more times a month)

Study 3A: Dissertation**10. If you gamble, where do you do it? Please check all that apply.**

- ☐ At my own or a friend's house/apartment
- ☐ At the casino
- ☐ At a club/underground establishment
- ☐ On the internet
- ☐ I don't gamble

11. What is the largest amount of money you have ever lost gambling?

- ☐ I have never lost money
- ☐ Between \$1 and \$50
- ☐ Between \$51 and \$100
- ☐ Between \$101 and \$500
- ☐ Between \$501 and \$1000
- ☐ More than \$1000

12. What is the largest amount of money you have ever won gambling?

- ☐ I have never won money
- ☐ Between \$1 and \$50
- ☐ Between \$51 and \$100
- ☐ Between \$101 and \$500
- ☐ Between \$501 and \$1000
- ☐ More than \$1000

13. Finally, where did you learn about this survey?

Thank you for completing this survey! Please hit the submit button to be taken to the debriefing/prize entry page.

1. Paranormal Belief Scale (Jones, Russell, & Nickel, 1977; modified by Presson & Benassi)

Please read each of the following statements and indicate, using the following rating scale, the degree to which you agree or disagree with each one.

1-----2-----3-----4-----5
Strongly Disagree Disagree Undecided Agree Strongly Agree

- _____ 1. It is likely that many phenomena such as ESP (Extra Sensory Perception) will one day be proven to exist.
- _____ 2. I believe that, at least on some occasions, I can read another person's mind through ESP.
- _____ 3. ESP is a gift that many people have, and should not be confused with the elaborate tricks used by entertainers.
- _____ *4. All of the reports of scientific proof for the existence of psychic phenomena are sensationalism with no factual basis.
- _____ 5. With proper training anyone could learn to read other people's minds.
- _____ 6. Plants can sense the feelings of humans through a form of ESP.
- _____ 7. ESP has been scientifically proven to exist.
- _____ 8. I believe that psychic phenomena are real.
- _____ 9. Some people can make physical objects move or cause them to change shape by their powers of concentration.
- _____ 10. Some people have the power to bend objects (e.g., spoons) with only their thoughts.
- _____ 11. Some people have the ability to accurately predict the outcomes of dice throws.
- _____ 12. There may be some validity to psychic phenomena.
- _____ 13. With proper training, I could develop ESP.
- _____ 14. I believe that I have precognitive ability.
- _____ 15. I believe that I can project my thoughts to another person.
- _____ *16. The results of dice throwing depend entirely on chance.
- _____ 17. Some people can accurately visualize things before they happen.
- _____ 18. If I concentrate enough I could learn to bend objects (e.g., spoons) using only my thoughts.
- _____ *19. Premonitions never have a psychic basis to them.
- _____ 20. If I wanted to see what the future has in store for me, I could use tarot cards or an astrology chart.

2. Internality, Powerful Others, and Chance Scales (Levenson, 1981)

-3 strongly disagree -2 disagree -1 slightly disagree +1 slightly agree +2 agree +3 strongly agree

1. Whether or not I get to be leader depends mostly on my ability
2. To a great extent my life is controlled by accidental happenings.
3. I feel like what happens in my life is mostly determined by powerful people.
4. Whether or not I get into a car accident depends mostly on how good a driver I am.
5. When I make plans, I am almost certain to make them work.
6. Often there is no chance of protecting my personal interests from bad luck happenings.
7. When I get what I want, it's usually because I am lucky.
8. Although I might have good ability, I will not be given leadership responsibility without appealing to those in positions of power.
9. How many friends I have depends on how nice a person I am.
10. I have often found that what is going to happen will happen.
11. My life is chiefly controlled by powerful others.
12. Whether or not I get into a car accident is mostly a matter of luck.
13. People like myself have very little chance of protecting our personal interests when they conflict with those of strong pressure groups.
14. It's not always wise for me to plan too far ahead because many things turn out to be a matter of good or bad fortune.
15. Getting what I want requires pleasing those people above me.
16. Whether or not I get to be a leader depends on whether I am lucky enough to be in the right place at the right time.
17. If important people were to decide they didn't like me, I probably wouldn't make many friends.
18. I can pretty much determine what will happen in my life.
19. I am usually able to protect my personal interests.
20. Whether or not I get into a car accident depends mostly on the other driver.
21. When I get what I want, it's usually because I worked hard for it.
22. In order to have my plans work, I make sure that they fit in with the desires of people who have power over me.
23. My life is determined by own actions.
24. It's chiefly a matter of fate whether or not I have a few friends or many friends.

3. The Religiousness Scale (Strayhorn, Weidman, & Larson, 1990).

In areas that refer to "God" please insert the higher power for your own religion.

1. How religious would you say you are? (Not at all, not very much, somewhat, pretty much, very much)
2. How often do you study the Bible or other religious literature privately? (Never, seldom, occasionally, frequently [at least once a week, but not daily], daily)
3. *Other than at mealtime, how often, on the average, do you pray to God privately? (Several times per day, daily, occasionally, seldom, never)
4. *When you are tempted to something wrong, how often do you ask God for strength to do right? (Very often, often, sometimes, seldom, never)
5. *When you have decisions to make, in your everyday life, how often do you ask yourself what God would want you to do, or ask God for help in making the decision? (Very often often, sometimes, seldom, never)
6. On the average, how often have you attended religious worship services (i.e., Sunday morning, evening, and/or other days) during the last year? (Never, a few times a year, only on Holidays, once or twice a month, weekly or almost weekly, more than once a week)
7. How much of your income do you donate per year to a church or religious organization? (None, a very small donation relative to my income, a small donation relative to my income, a medium donation relative to my income, a large donation relative to my income)
8. How often do you serve a church or other religious organization in Sunday school teaching, church project leadership, or other responsibilities? (Never, a few times a year, once or twice a month, weekly or almost weekly, more than once a week)
9. How would you describe the nature of your relationship to God? (No relationship or do not use the concept of God, distant relationship, between distant and close relationship, close relationship, very close relationship)
10. How often do you experience or feel God's approval for some good act you have done? (Never, seldom, occasionally, often, very often)
11. How often do you experience God's disapproval for some undesirable act you have done? (Never, seldom, occasionally, often, very often)
12. To what extent are you conscious of some religious goal or purpose in life which serves to give direction to your life? (Not at all, to a small extent, to a moderate extent, to a large extent, to a very large extent)

APPENDIX B: IRB APPROVAL LETTERS



UNIVERSITY of NEW HAMPSHIRE

April 29, 2008

Erin Goforth
Psychology
Durham, NH 03824

Study: Illusions of Prediction in Relation to Control as well as Religious and Paranormal Involvement

Approval Date: 11/8/2007

The Psychology Departmental Review Committee, a subcommittee of the Institutional Review Board (IRB) for the Protection of Human Subjects in Research, reviewed and approved the protocol for your study as Exempt as described in Federal Regulations 45 CFR 46, Subsection 101 (b).


Approval is granted to conduct the project as described in your protocol. Changes in your protocol must be submitted to this committee for review and approval prior to their implementation.

The protection of human subjects in your study is an ongoing process for which you hold primary responsibility. In receiving approval for your protocol, you agree to conduct the project in accordance with the ethical principles and guidelines for the protection of human subjects in research, as described in the Belmont Report. The full text of the Belmont Report is available on the Office of Sponsored Research (OSR) webpage at <http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.htm> or by request from the OSR.

There is no obligation for you to provide a report to this committee upon project completion unless you experience any unusual or unanticipated results with regard to the participation of human subjects. Please report such events to this office promptly as they occur.

If you have questions or concerns about your project or this approval, please feel free to contact a member of the Psychology Departmental Review Committee.

For the IRB,


Julie F. Simpson
Manager

cc: File



UNIVERSITY of NEW HAMPSHIRE

April 29, 2008

Erin Goforth
Psychology
Durham, NH 03824

Study: Illusions of Prediction in Relation to Control as well as Religious and Paranormal Involvement

Approval Date: 02/22/2008

The Psychology Departmental Review Committee, a subcommittee of the Institutional Review Board (IRB) for the Protection of Human Subjects in Research, reviewed and approved the protocol for your study as Exempt as described in Federal Regulations 45 CFR 46, Subsection 101 (b).

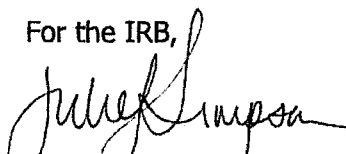
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For the IRB,


Julie F. Simpson
Manager

cc: File